

Development of the Neuromuscular Rehabilitation via Telebiofeedback as a Portal for Home Care

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Background

Although we intend to recruit patients with different diagnoses, stroke will likely be the predominant diagnostic entity. Stroke is the third leading cause of death in United States, and one of the principal causes of disability. Each year, 570,000 people in the US suffer a stroke. Costs for care of persons following stroke have been estimated in excess of \$30 billion annually in the United States. Rehabilitation treatment is fundamental in the recovery of patients following stroke with the degree of success from rehabilitation related to the magnitude of damage caused by the stroke, the composition of the rehabilitation team, the timing of and length of time in rehabilitation as well as the site of rehabilitation services.

Injury to the central nervous system has been thought to result in permanent irreversible neuronal death without the possibility of neuronal regeneration. Rehabilitation has been directed towards the enhancement of the natural healing processes and at establishing compensatory strategies. Therapy interventions are thus concentrated in the early phase following stroke and are focused on teaching patients to compensate for motor control losses and to maximize functional capabilities. This approach appears to no longer be valid.

Methods

We will use the BioRehab™ System as the treatment intervention (*independent variable*). The BioRehab System is a surface EMG system that uses a PC game as an interaction metaphor and feedback mechanism to the patient. The EMG device is a 4 -channel EMG (Pathway MR-400 EMG amplifier) connected to a dedicated personal computer (Windows platform) running BioRehab™ software and adapted PC games designed to engage patients into performing specific muscle activation combinations according to the therapeutic goals established by the therapist. The system uses the muscle activation detected by the EMG electrodes to control movements of the cursor or of some game element (like a car steering wheel) on the computer's screen. The therapist can select which muscle group will be used to drive each cursor movement and which game is more adequate for each patient as well as the difficulty level for the patient to perform their muscle contractions.

Conclusions

A telemedicine model for supplying health care has the potential of being a cost-effective alternative that may be very beneficial in providing access to appropriate therapy to patients following stroke. The integration of rehabilitation treatment into the telemedicine technologies has been successfully used in several therapy applications and offers access to care when otherwise it could not be provided.